

New / Replacement of Water Well and Well Collection
Line – Sims Bayou
WBS No. S-000100-0024-4

ADDENDUM

Document 00910

ADDENDUM NO. 1

Date of Addendum: 4/1/2016



PROJECT NAME: New / Replacement of Water Well and Well Collection Line – Sims Bayou

PROJECT NO: WBS No. S-000100-0024-4

BID DATE: April 7, 2016 (There is no change to the Bid Date.)

FROM: J. Timothy Lincoln, P.E., City Engineer
City of Houston, Department of Public Works and Engineering
611 Walker Street, 15th Floor
Houston, Texas 77002
Attn: Na Yao, P.E., Project Manager

TO: Prospective Bidders

This Addendum forms a part of the Bidding Documents and will be incorporated into the Contract documents, as applicable. Insofar as the original Project Manual and Drawings are inconsistent, this Addendum governs.

This Addendum uses the change page method: remove and replace or add pages, or Drawing sheets, as directed in the change instructions below. Change bars (|) are provided in the outside margins of pages from the Project Manual to indicate where changes have been made; no change bars are provided in added Sections. Reissued Drawing Sheets show the Addendum number below the title block and changes in the Drawing are noted by a revision mark and enclosed in a revision cloud.

CHANGES TO PROJECT MANUAL

INTRODUCTORY INFORMATION

1. Document 00010 – Table of Contents. Replace page 00010-5.

SPECIFICATIONS

2. Section 01110 – Summary of Work. Replace page 01110-5.
3. Section 02536 – Discharge Piping and Appurtenances. Replace Section in its

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02-01-2004

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entirety.

4. Section 13430 – System Requirements. Delete Section.
5. Section 15162 – Lineshaft Deep Well Pumps. Replace Section in its entirety.

CHANGES TO DRAWINGS

6. Replace Sheet 9, Well Design and Discharge Manifold, with revised Sheet 9.
7. Replace Sheet 29, Electrical Enlarged Site Plan, with revised Sheet 29.
8. Replace Sheet 30, Electrical One Line Diagram and Load Analysis, with revised Sheet 30.
9. Replace Sheet 33, Electrical Details Sheet 1 of 2, with revised Sheet 33.
10. Replace Sheet 34, Electrical Details Sheet 2 of 2, with revised Sheet 34.

CLARIFICATIONS

11. Question: The well pump specification (section 15162) states that the pump should include fusion epoxy lined water passages. Will porcelain lining be acceptable instead?

Answer: Porcelain lining will not be accepted for this installation.

12. Question: The well pump specification (section 15162) states that the motor enclosure shall be WP-II. However, the motor specification (section 16172) states that the motor enclosure shall be TEFC. Please clarify if the motor enclosure shall be WP-II or TEFC.

Answer: The motor enclosure will be WP-II.

13. Question: Please clarify if the well motor shall be VFD (inverter duty) rated.

Answer: The motor will not be inverter duty rated.

14. Question: The well motor spec (section 16172) specifies bearing and winding RTDs. However, the electrical plans sheets/drawings do not include any provisions for RTDs. Please clarify if RTDs are required for the well motor.

Answer: Provide motor as described in revised Section 15162, with RTDs, for future connection. RTD Conduit and wiring are not required.


14. Question: Please confirm that the correct well motor voltage is 2300 volts.

15.

Answer: The voltage of 2300 volts is correct.

END OF ADDENDUM NO. 1

DATED:


Ravi Kaleyatodi, P.E., CPM
Senior Assistant Director
Department of Public Works and
Engineering

AEI Engineering, LLC
TBPE Firm Registration No. F-1697

END OF DOCUMENT

<u>Doc. No.</u>	<u>DocumentTitle</u>	<u>Doc. Date</u>
*02525	Tapping Sleeves and Valves.....	01-01-2011
02528	POLYETHYLENE WRAP	01-01-2011
02529	Water Wells.....	01-26-2016
02536	Discharge Piping and Appurtenances	09-17-2015
02611	REINFORCED CONCRETE PIPE	02-01-2011
02621	GEOTEXTILE	10-01-2002
02631	STORM SEWERS.....	01-26-2012
02632	CAST-IN-PLACE INLETS, HEADWALLS AND WINGWALLS.....	10-01-2002
02711	HOT MIX ASPHALT BASE COURSE	07-01-2009
02712	CEMENT STABILIZED BASE COURSE.....	10-01-2002
02713	RECYCLED CRUSHED CONCRETE BASE COURSE	07-01-2009
02730	Porous Flexible Paving	11-28-2015
02741	ASPHALT CONCRETE PAVEMENT	07-01-2009
02751	CONCRETE PAVING	07-01-2009
02752S	Concrete Pavement Joints	12-30-2009
*02752	Concrete Pavement Joints	10-01-2002
02753	CONCRETE PAVEMENT CURING	10-01-2002
02754	CONCRETE DRIVEWAYS	09-01-2002
02775	CONCRETE SIDEWALKS.....	10-01-2002
02821	Chain Link Fences and Gates	09-13-2015
02911S	Topsoil.....	09-13-2015
*02911	Topsoil.....	10-01-2002
02915	TREE PLANTING	01-01-2011
02921	HYDRO MULCH SEEDING	01-01-2011
02922	SODDING	07-01-2009
DIVISION 3 - CONCRETE		
03315	CONCRETE FOR UTILITY CONSTRUCTION	10-01-2002
DIVISION 13 – SPECIAL CONSTRUCTION		
13300	Process Instrumentation and Controls-General Provisions.....	09-10-2015
13315	Process Instrumentation and Controls-Products.....	09-10-2015
13325	Control Panels and Panel Mounted Equipment.....	09-10-2015
13441	SCADA Software Engineering Security and Quality Requirements	09-10-2015
DIVISION 15 – MECHANICAL		
15162	Lineshaft Deep Well Pumps.....	01-06-2016

28. Clearing of excess vegetation around storm pipe inlet, all complete and installed as described in applicable provisions of Section 02233 and shown on Drawings.
29. Site restoration, complete as described in applicable provisions of Section 01740 and shown on Drawings.

C. Well Casing Corrosion Control System:

1. If the corrosion inspector/tester performing the stray current assessment recommends cathodic protection, the Contractor shall employ Corpro Companies, Inc. or approved equal to provide a cost proposal for the design and install the cathodic protection system. The design of the cathodic protection system shall be submitted to the City for approval prior to purchasing or installation of the equipment. A cash allowance not to exceed \$80,000.00 shall be reimbursed to the Contractor for the cathodic protection system. The reimbursements shall be based on the actual costs from Corpro Companies, Inc. or approved equal for the design and installation of the system in Item 44 of the Extra Unit Price Section of Document 00410 - Bid Form.

D. SCADA Communications:

1. The communications at the well shall be via modbus radio antennas to communicate to the Sims Bayou Pump Station. The City of Houston will provide the SCADA system software and the Contractor is responsible for the equipment installation, programming (including well, main PLCs and HMI) and functional communication with each well.

E. Well requirements:

1. A pilot hole shall be drilled at the well site prior to continuing with drilling the well at the site. Section 02529 includes a provision for paying the Contractor a lump sum amount if the pilot hole should be abandoned.
2. Well No. 7 is to meet certain specific capacity requirements, pumping rate requirements and suspended solids production limits. These are described in Section 02529. Monetary penalty clauses for not meeting well specific capacity requirements and suspended solids production limits are given in Section 02529.

F. Harris County Flood Control District

Section 02536

DISCHARGE PIPING AND APPURTENANCES

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. This section includes the furnishing and installation of the discharge manifolds and appurtenances, splash-boxes, drain line and surface-runoff swales, and potable water collection line. All valves, pipe, fittings, couplings and gauges subject to the possibility of shut-in pump head shall be sized to be safe from burst failure when exposed to the expected pressure developed by the pump if shut in while operating, with the stages and column setting required for future operating conditions and with the static water level no lower than 250 feet. The work includes the furnishing and installation of valves, air and vacuum release assembly fittings, meters, gauges, discharge piping and supports. The work to be done under these specifications is described in part by the plans.

1.02 UNIT PRICES

- A. No separate payment will be made for Work as required by this Section.

1.03 REFERENCE STANDARDS

- A. Perform all work in this section in accordance with applicable sections of the latest editions of the following standards, except as modified in this specification.
 - 1. American Water Works Association.
 - 2. American Society of Testing and Materials.
 - 3. National Sanitation Foundation (NSF).
 - 4. American National Standards Institute.

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.
- B. Submit an affidavit stating that the valves, appurtenances and all materials used in their construction conform to the applicable requirements of the American Water Works Association (AWWA) standards, and this specification section and that all tests specified therein have been performed and all test requirements have been met.

**DISCHARGE PIPING
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- C. All newly installed pipes and related products must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and must be certified by an organization accredited by ANSI. This certification is to be submitted in writing to Engineer. Submit mill test certificates for all steel piping.
- D. Submit shop drawings for all valves and operators, couplings, valve boxes and similar appurtenances for review and approval, prior to fabrication, shipment or purchase.
- E. Operation and Maintenance Manuals: Six copies of the O&M Manuals shall be submitted for each item of equipment provided under this section.

PART 2 PRODUCTS

2.01 VALVES

- A. Valves shall open counterclockwise.
- B. Gate Valves:
 - 1. Gate valves shall comply with AWWA Standards, latest edition. The valves shall be of the iron body, bronze mounted, resilient wedge, outside screw and yoke design. Gate valves installed in subsurface shall comply with Section 02521 - Gate Valves.
 - 2. The valves shall be manufactured for a water working pressure of 250 pounds per square inch. The shell shall be manufactured for test pressure of 450 pounds per square inch.
 - 3. The valves shall have flanged ends. The dimensions and drilling of the end flanges shall conform to the American National Standards Institute Specifications 816.1 for Class 125 cast iron flanges.
 - 4. All gate valves shall be hand-wheel operated and open counterclockwise.
 - 5. Gate valve stems shall be of a high-tensile strength manganese bronze or other non-corrodible metal which has a tensile strength greater than 60,000 pounds per square inch.
 - 6. The valves shall be manufactured with lubricated packing stem seals.
 - 7. Valves furnished under these specifications shall be Dresser M. & H. Style 881 -02, OS&Y flanged ends, or an equivalent approved by the City.

- C. Check Valve: The check valve shall be a new iron body, globe style, silent check valve with stainless steel trim and resilient seating (Buna-N). The check valve plug, seat and spring shall be manufactured of stainless steel. The Buna-N resilient seating shall be compression molded (not glued or chemically bonded) onto the valve plug seat. The valve plug shall be center guided at both ends with a thru integral shaft and spring loaded for guaranteed silent shutoff operation. The stainless steel spring shall be helical or conical. The seat and plug shall be hand replaceable in the field for ease of maintenance. The flow area through the valve body shall be equal to or greater than the cross-sectional area of the equivalent pipe size. The check valve shall be guaranteed not to stick closed. The check valve shall be an APCO Series 600 globe style silent check valve, or approved equal, of 300-pound class with 125-pound flat-faced flanged ends.
- D. Air and Vacuum Release Valve Assembly: The air and vacuum release valve body shall be constructed of cast iron and shall be equipped with flanged discharge connections. The float shall be constructed of stainless steel. The valve shall be sized according to manufacturer's instructions to accommodate a pump capacity of up to 2,800 gpm and shall be rated at a minimum working pressure of 250 pounds per square inch. The valve furnished shall be a 4-inch APCO #1704/152 soft durometer rubber seat for less than 30 psi, and 4-inch APCO surge check or an equivalent approved by the City, depending on the well discharge. Air and vacuum release valve discharge shall be "goosenecked" 180 degrees faced down, and screened with 304 stainless steel 16 mesh fabric. Details of this valve assembly shall be in accordance with the plans.
- E. Brass Valves: One-inch or less brass valves shall be of all-brass construction with double discs and parallel seats and shall be warranted for a minimum working pressure of 300 pounds per square inch. Valves furnished under these specifications shall be of the Crane 431 type, or an equivalent approved by the City.

2.02 DISCHARGE MANIFOLD AND APPURTENANCES

- A. Steel Water Pipe and Fittings:
 - 1. All steel pipe furnished under these specifications shall comply with API specifications for line pipe standard 5L and with ASTM tentative specifications for welded and seamless steel pipe designation A53- 58AT.
 - 2. The 12-3/4-inch steel pipe shall have a weight of at least 49.56 pounds per foot and a wall thickness of at least 0.375 inch, and be designed to withstand a test pressure of at least 1,000 pounds per square inch. The 8-5/8-inch steel pipe shall have a weight of at least 28.55 pounds per foot and a wall

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thickness of at least 0.322 inch, and be designed to withstand a test pressure of at least 1,000 pounds per square inch.

3. All steel fittings furnished under these specifications shall have a minimum wall thickness of 0.375 inch, shall be rated at a minimum 500 pounds per square inch working pressure, and shall conform to American National Standards Institute B16.9 and to ASTM Specifications A-234 for Grade A seamless carbon steel fittings.
 4. The steel pipe shall be fitted with steel slip-on flanges, Class 150 or 300 as shown on the drawings. Steel fittings shall be fitted with steel weld-neck flanges, Class 150 or 300 as shown on the drawings. Dimensions and drilling of the flanges shall conform to American National Standards Institute B16.5.
 5. The flanges shall be connected with rubber ring gaskets 1/16 inch thick.
 6. Bolts shall conform with ASTM A 307, Grade B, with heavy hex nuts.
 7. Flanged joints made up between steel and ductile iron pipe flanges shall be maintained electrically isolated by means of the use of an insulating kit (Pipeline Seal and Insulator or equal).
- B. Flexible Coupling: The Flexible Coupling shall be Dresser Style 38 for steel pipe and shall be reinforced with the coupling harness, as shown on the drawings.
- C. Pressure Gauge: The pressure gauge assembly shall be as shown on the plans. All fittings and other equipment shall be manufactured to withstand a working pressure of at least 300 pounds per square inch. The steel discharge pipe requires a 1/2-inch IPT thread-o-let welded to the top centerline of the header at the designated location for the pressure gauge assembly. The hole through the pipe wall inside the thread-o-let shall be drilled out.
- D. Sample Cock: The sample cock shall be as shown on the plans. It shall be chrome plated, thread less male hose bib, Burlington Model #2001 O/E, with plain end and 3/4-inch IPS, thread inlet brass with chrome plating. The steel discharge pipe requires a 3/4-inch IPT thread-a-let welded to the side of the discharge header for a 3/4-inch Mueller H10046, or approved equal, corporation stop with inside IPT outlet for the sample cock assembly. The hole through the pipe wall inside the thread-a-let shall be drilled out.
- E. High Pressure Safety Cutoff Switch Assembly: A high pressure safety cutoff switch assembly, United Electric Controls Model H100-358-1530, shall be installed in the system as shown on the plans. The steel discharge pipe requires a 1/4-inch IPT thread-a-let welded to the top centerline of the header at the designated location

for the high pressure safety cutoff switch assembly. The hole through the pipe wall inside the thread-a-let shall be drilled out. The switch shall not contain mercury and shall have a push button reset.

F. Flow Meter:

1. Flow meter shall be a magnetic meter meeting the requirements in Section 13315 – Process Instrumentation and Controls - Products.
2. Furnish one portable primary head simulator for calibration and testing of magnetic flowmeter signal converters. The calibrator shall be furnished complete with, test leads, carrying case and accessories. Calibrator shall be furnished by the flowmeter manufacturer, and shall be fully matched to the instrumentation furnished.

G. Conductor Casing Vent:

1. The conductor casing vent shall be located as shown on the plans. The casing vent tube shall be installed to achieve a 45-degree bend from vertical and exit the side of the concrete pump foundation. The casing vent tube terminates so as to provide a minimum 15-inch gap above the top of the foundation block to the mesh screens.
2. The casing vent consists of a 4" x 4" tee, two 4-inch nipples, and two 4-inch 90-degree elbows with #16 mesh screen of ASTM Standard A276-REV A-89 316 stainless steel securely fastened to the female end of each elbow with ASTM Standard A276-REV A-89 316 stainless steel bands.

H. Paint:

1. Exterior surfaces of valves, discharge head, pipe and fittings above ground shall be given a three-coat epoxy/epoxy/polyurethane system as described in paragraph 3.04B in this Section.
2. Paint color will be selected by City.

2.03 SPLASH-BOX AND SURFACE-RUNOFF DRAIN LINE

- A.** The swale from the splash-box shall be connected to the existing roadside ditch on the eastern side of the well site.

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2.04 POTABLE WATER COLLECTION LINE

- A. The potable water collection line between the steel discharge manifold and the PVC piping outside the well site shall be ductile iron pipe.
- B. Ductile iron pipe and fittings shall conform to applicable provisions of Section 02501 - Ductile Iron Pipe and Fittings.
- C. The ductile iron pipe shall have the diameter as shown on the Drawings.

PART 3 EXECUTION

3.01 DIMENSIONS

- A. Elevation and length dimensions shown on the plans are only approximate and must be field-checked by the Contractor prior to assembly.

3.02 HIGH PRESSURE SAFETY CUTOFF SWITCH ASSEMBLY

- A. This switch shall be connected in series with the overload relay in a manner approved by the City.

3.03 ROSSUM SAND CONTENT TESTER

- A. A welded connection to the discharge pipe, with corp stop, shall be provided as shown on the Drawings for future installation of a Rossum Sand Content Tester by the City.

3.04 WRAPPING AND COATING

- A. Internal Coating:
 - 1. All material used for internal coating of steel carrier pipe must be NSF61 listed as suitable for contact with potable water as required by Chapter 290, Rules and Regulations for Public Systems, Texas Commission on Environmental Quality.
 - 2. All steel pipe and fittings, above and below ground, shall be internally coated with either of the following systems.
 - a. Liquid epoxy in accordance with AWWA C210, "Liquid Epoxy Coating System for the Interior and Exterior of Steel Water Pipelines," except as modified herein. System shall consist of three coats of polyamide epoxy (no coal tar material) as follows:

- 1) Prime Coat: Two part, chemically cured, pigmented, polyamide epoxy; 4-6 mils DFT.
 - 2) Intermediate Coat: Two part polyamide epoxy; 4-6 mils DFT.
 - 3) Finish Coat: Two part polyamide epoxy; 4-6 mils DFT.
- b. Total system to have a minimum DFT of 12 mils and a maximum DFT of 18 mils. Each coat to be in contrasting colors, with the prime coat being buff and the finish coat being white. All material shall be supplied by the same manufacturer. Coal-tar epoxy material is not permitted. Surfaces to be coated shall be abrasive blast cleaned to a near-white finish in accordance with SSPC-SP10 (NACE 2) to establish an average anchor profile of 2.0 to 3.0 mils, with no individual reading greater than 4.0 mils or less than 1.5 mils. Prior to coating, the prepared and cleaned surface is to be inspected for evidence of non-visible contaminants such as soluble salts and/or chlorides in accordance with NACE Technical Committee Report "Surface Preparation of Soluble Salt Contaminated Steel Substrates Prior to Coating," NACE Publication 6G186. The surface shall be recleaned as necessary until free of such contaminants.
- c. Fusion-bonded epoxy in accordance with AWWA C213, "Fusion-Bonded Epoxy Coating for the Interior and Exterior of Steel Water Pipelines."

B. External Coating:

1. Above Ground

- a. All aboveground steel piping and fittings shall be externally coated with a three-coat epoxy/epoxy/polyurethane system in accordance with AWWA C218, "Coating the Exterior of Aboveground Steel Water Pipelines and Fittings," Section 2.5, Coating System No. 4-91, except as modified herein.
- 1) Prime Coat: Two component, pigmented, catalyzed polyamide epoxy primer; 3-4 mils DFT.
 - 2) Intermediate Coat: Two component, catalyzed polyamide epoxy; 4-6 mils DFT.

- 3) Finish Coat: Two component aliphatic polyurethane; 3-4 mils DFT.
- b. Total system to have a minimum DFT of 10 mils and a maximum DFT of 14 mils. Each coat shall be in contrasting colors, with the prime coat being buff and the finish coat color selected by NHCRWA. All material shall be supplied by the same manufacturer. Surfaces to be coated shall be abrasive blast cleaned to a near-white finish in accordance with SSPC-SP1 0 (NACE 2) to establish an average anchor profile of 2.0 to 3.0 mils, with no individual reading greater than 4.0 mils or less than 1.5 mils. Prior to coating, the prepared and cleaned surface is to be inspected for evidence of non-visible contaminants such as soluble salts and/or chlorides in accordance with NACE Technical Committee Report, " Surface Preparation of Soluble Salt Contaminated Steel Substrates Prior to Coating," NACE Publication 6G186. The surface shall be recleaned as necessary until free of such contaminants.

C. General

1. All protective coatings shall be shop applied, except for field repairs and coating of field welded joints. The City may provide for witness of inspection and testing of shop applied coatings; however, such witness shall not relieve the Contractor of the responsibility to furnish material, perform work and provide quality control in accordance with the applicable AWWA standard and/or the requirements of these specifications. All field repairs shall be inspected and tested by the Contractor and approved by the City's inspector.
2. The substrate surface profile and minimum and maximum individual and total dry film thickness (DFT) indicated herein shall apply unless non-conformance with coating manufacturer's recommendation is indicated. No requirement of this specification shall cancel or supersede the specific written directions and recommendations of the specific coating manufacturer so as to jeopardize the integrity of the applied system. Dry film thickness shall be measured in accordance with SSPC PA2.
3. All shop coating and field repairs shall be field tested by the Contractor for holidays, pinholes or discontinuities at voltage levels required by the applicable AWWA standard and in accordance with the applicable NACE procedure, i.e. RPO 188, RPO 274, TMD 384, etc., latest revision. The test procedure, including voltage levels to be used, shall be submitted to the City prior to testing. All holidays shall be repaired in accordance with the applicable AWWA standard. Documentation by a NACE certified inspector

of compliance with the tests required herein shall be provided by the Contractor.

4. Handling, storage and field procedures for shop coated pipe shall be in accordance with the applicable AWWA standards. All pipe ends shall be adequately sealed and protected from damage during handling and storage, and such protection shall not be removed until immediately prior to installation. Pipe shall not be lifted using caliper clamps or hooks at ends of pipe. Any damage to the pipe or the protective coating from any cause during the installation of the pipe and before final acceptance by the City shall be repaired as directed by the Engineer's inspector and in accordance with the applicable standards.
5. The interior of pipe and fittings shall be kept clean of all foreign matter before installation and until the work has been accepted. Joint contact surfaces shall be kept clean until jointing is complete.
6. All AWWA standards referenced herein shall be the latest published revision thereof.
7. The Contractor shall furnish an affidavit of compliance that all materials and work furnished comply with the requirements of the applicable AWWA standards and these specifications.

3.05 PAINTING

- A. Rust, dirt and other foreign materials shall be removed from the surfaces by sandblasting.
- B. Special attention shall be given to the complete removal of oil and grease from all surfaces to be painted.
- C. Galvanized pipe and brass shall be washed down with fresh solvent and allowed to dry before being painted.
- D. Nameplates will not be painted.
- E. All painting shall be performed in workmanlike manner, by experienced workmen, and in the manner recommended by the manufacturer of such materials. Sufficient time shall be allowed for each coat of paint to dry thoroughly before the following coat is applied.

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3.06 CHLORINATION

- A. The discharge piping shall be chlorinated in accordance with AWWA C651 and applicable provisions of Section 02514 - Disinfection of Waterlines.

3.07 TESTING FOR COLIFORM ORGANISMS

- A. After at least 500,000 gallons of water has been pumped from the well after all discharge piping has been assembled, and after any chlorination, samples of water shall be collected in sterile containers on at least three successive days and a test made of each sample for coliform organisms. The samples shall be taken by and the tests made by a laboratory approved by the City, and the City shall be furnished copies of the reports.
- B. At least three successive daily samples shall be free of coliform organisms or the Contractor shall resterilize the well, pump and piping and retest until this provision is met, or until such time as the City becomes convinced that coliform organisms are not present in the water as a result of the construction and operations of the Contractor.

3.08 MAGNETIC FLOW METER

- A. Ground magnetic flow meter flow tubes and grounding rings in strict accordance with the manufacturer's recommendations.
- B. The magnetic flowmeter system shall be verified and started-up by a factory trained representative. An AMS Intelligent Device Manager Software shall be available to configure parameters, run diagnostics, and provide meter documentation. Calibration and service reports shall be provided to the contractor and end user.

END OF SECTION

Section 15162

LINESHAFT DEEP WELL PUMPS

PART 1 G E N E R A L

1.01 SECTION INCLUDES

- A. Requirements for furnishing, installing and testing a deep well lineshaft pump and constructing a concrete pump foundation at the site indicated on Drawings. The complete installation include new lineshaft pump, steel discharge head, column pipe, tubing and shafting, air line, solution tubing and associated strainer and suction adapter to affect the complete operational water well pumping system.

1.02 UNIT PRICES

- A. No separate payment will be made for Work as required by this Section. Price for pump equipment is included as Item 2 in Document 00410-Bid Form and adjusted as necessary with Items 40 and 41.

1.03 ORDERING OF PUMP AND MOTOR

- A. The pump and motor shall not be ordered without written instructions or approval of the City. Written instructions or approval of the City shall occur after the satisfactory completion, as determined by the City, of the pumping test of a well. Once the City's instructions are received, the Contractor shall order the pump and motor as soon as practicable. No pump bowl assembly shall be assembled or released for shipment without the written approval of the City.

1.04 REFERENCE STANDARDS

- A. The pumping unit shall conform to the latest edition of each of the following standards as applicable, unless otherwise specifically stated in this section. Pump shall comply with all local and state sanitary and safety regulations.
 - 1. AWWA E103 – Horizontal and Vertical Line-Shaft Pumps.
 - 2. The Hydraulic Institute – Centrifugal Pump Section.

1.05 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01330 - Submittal Procedures.

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B. Submit complete descriptive matter and data showing details of construction and other pertinent information pertaining to the equipment the Contractor proposes to furnish including rated capacities, weights, accessories, electrical data and wiring diagrams.

C. Submit the following pump and motor information to the City for the City's approval, prior to the City issuing approval for ordering.

- | | | |
|-----|---|-------|
| 1. | Make of pump and pump designation | _____ |
| 2. | Number of stages for present conditions | _____ |
| 3. | O.D. of bowls, inches | _____ |
| 4. | I.D. of column and wall thickness, inches | _____ |
| 5. | O.D. of column couplings, inches | _____ |
| 6. | Length of column sections, feet and inches | _____ |
| 7. | Calculated thrust at design condition for present operation, pounds | _____ |
| 8. | Motor thrust bearing capacity at specified RPM, pounds | _____ |
| 9. | Motor thrust bearing life, years | _____ |
| 10. | Brake horsepower at design condition for present operation, HP | _____ |
| 11. | Field efficiency of pump at design condition for present operation, percent | _____ |
| 12. | Wire-to-water efficiency at design condition for present operation, percent | _____ |
| 13. | Make of motor and rated horsepower | _____ |
| 14. | Speed of motor, RPM | _____ |
| 15. | Motor efficiency, percent | |
| | a. Half load | _____ |
| | b. Three-quarter load | _____ |
| | c. Full load | _____ |

16. Motor power factor, percent
- | | |
|-----------------------|-------|
| a. Half load | _____ |
| b. Three-quarter load | _____ |
| c. Full load | _____ |
- D. Submit curves for the City's approval showing guaranteed field performance of the pump the Contractor proposes to furnish based on present operating conditions. Curves shall show head-capacity, brake horsepower, motor input horsepower, pump efficiency, and overall (wire-to-water) efficiency. Note that field and not laboratory performance is to be shown on curves at scales subject to approval of the City.
- E. Submit installation, operation and maintenance manuals, parts description, and similar instruction books. Provide three copies of each.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Flowserve Pumps.
- B. Floway Pumps.
- C. Peerless Pumps.
- D. Goulds Pumps.
- E. American Turbine Pumps.
- F. Ruhrpumpen Pumps.

2.02 GENERAL

- A. Pump is to be of the deep well, multi-stage, vertical turbine, lineshaft type. Column pipe friction losses and losses of strainer, discharge elbow and pump are not included in scheduled total field head.

2.03 PUMP SELECTIONS

- A. Select pump conservatively for scheduled conditions. Furnish pump which has highest available efficiency, with peak efficiency at or near rated conditions. Select pump that have a steep head-capacity curve within 400 gpm of rated conditions and continuously rising head from runout to shutoff.

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- B. Provide motors of the type and speed scheduled. Select motors that are not overloaded throughout the entire range of pump operation.
- C. Operating Conditions
1. Definitions:
 - a. Total field head, or field head, as stipulated in these Specifications is the sum of the pressure head, in feet, at the center line of the pump discharge plus the vertical distance, in feet, from the center line of the pump discharge to the pumping level in the well.
 - b. Brake horsepower is the horsepower supplied to the shaft of an installed pump by the driver.
 - c. Field efficiency of an installed pump is the ratio of output power to input power supplied to the shaft, expressed as percent.
 - d. Overall efficiency of a pump installation is the ratio of the output power to input power supplied to the driver, expressed as percent.
 - e. Setting is the normal distance from the base plate to the top of the bowl assembly.
 2. Design Condition:
 - a. The pump is to be designed to meet the present operating conditions given herein.
 - b. The Contractor is to state the number of stages required for the present conditions.
 - c. Curves showing guaranteed overall field performance of the pump offered for the present operating conditions shall be submitted to the City for approval before ordering the pump. All components of the pump to be installed under this contract shall be designed to withstand 1-1/2 times shutoff pressure developed by the pump with the stages and column setting required for future operating conditions and with the static water level no lower than 350 feet. Any balancing of the impellers for high thrust conditions required by the future operating conditions shall be incorporated in the construction of the present pump before it is assembled.

D. Provide pump to meet the following anticipated capacities and conditions:

1. Sims Bayou Water Well No. 7:

a.	Design pumping rate, gpm	2,800
b.	Estimated static water level, feet	240
c.	Estimated pumping water level, feet	360
d.	Estimated discharge head above ground, feet	45
e.	Estimated field head, feet	425
f.	Maximum diameter of pump bowls, inches	14
g.	Column pipe setting, feet	500
h.	Minimum column pipe diameter, inches	12
i.	Minimum column pipe wall thickness, inches	0.375
j.	Minimum pump shaft diameter, inches	2.1875
k.	Minimum motor name plate, horsepower	500
l.	Motor speed, rpm	1,770
m.	Motor voltage, volts	2,300
n.	Minimum pump efficiency at design pumping rate, percent	82

2.04 COMPONENTS

- A. Pump Head: The pump head shall be fabricated steel, with Class 150-pound ANSI flange. Design head to support pump set to a depth of at least 600 feet, column, motor, and maximum hydraulic thrust with 25 percent reserve. Sealed tension bearing at shaft to provide for continuous oil lubrication of shaft bearing during pump operation. Head to have sufficient space so that coupling can be installed below motor and above tube tension nut for easy motor removal. If unit weighs more than 28,000 pounds add steel lifting plate fitted with steel base plate. The discharge head shall be equipped with three openings herein described: 1-1/2-inch top tapped for air line tubing and two 2-1/2-inch top tapped for solution tubing. Holes in the discharge head also shall be provided for the

LINESHAFT DEEP WELL PUMPS

WBS No. S-000100-0024-4

anchor bolts set in the pump foundation. The Sims Bayou Well No. 7 column pipe will be 12-inch diameter and the discharge piping will be 12-inch diameter.

- B. Column Pipe: The total length of the column assembly on each pump shall be as specified from the base of the discharge head to the top of the bowl assembly. The column pipe shall be API-5L or ASTM A53, Grade B seamless prime pipe. "Limited service" or "Mill reject" pipe will not be acceptable. The column pipe shall be furnished in interchangeable sections not exceeding 20 feet in length and shall be connected with extra strong, threaded, sleeve type couplings. Pipes shall be butted in the couplings to insure perfect alignment after assembly. The couplings shall be designed to provide the required strength, with ample safety factor should the pump be lowered and stages added to meet future operating conditions. The top column shall be factory machined of the proper length so that no cutting or machine work in the field is required to set the pump with the correct amount of tension on the oil tubing.
- C. Shafting and Tubing: The line shaft shall be turned, ground and polished precision shafting, C1045 or approved equal. The shafting shall be supplied in interchangeable, threaded sections not over 20 feet long, with the ends machined smooth and at right angles to the axis of the shaft to insure perfect alignment. The shaft sections shall be connected with extra strong steel couplings machined from solid bar stock which must be of ample dimensions to provide a connection of greater strength than the shaft itself. Shafts must be true and straight before and after installation.

The shaft enclosing tube shall be Schedule 80 steel pipe, ASTM A 53, Type "E", Grade B threaded internally, 5-foot maximum lengths, connected by ASTM B505 or ASTM B584 bronze bearings, grooved for oil passage; coat tubing threads with sealing compound prior to assembly; support in column with rubber spiders, at maximum 40-foot spacing. The tube sections shall be straight, with ends machined square, to ensure that the entire length of the tubing will be straight and true when the ends are butted. The top tube shall be machined at the factory of the proper length to provide the correct tension in the oil tubing.

- D. Bowl Assembly:
1. Pump bowls, including discharge and suction cases, shall be of close-grained ASTM A48, Class 40, cast iron and shall have fusion epoxy lined water passages. Bowls shall have bronze sleeve type bushings to support and guide the shaft. Bushing material shall be bronze, ASTM B505 alloy C89835. Impeller shall be of the enclosed type, cast of bronze (ASTM B148 alloy 958 or B584 alloy 876) or stainless steel, accurately cast, machined, dynamically balanced and filed for optimum performance and minimum vibration. The impeller shall be single keyed or securely

fastened to the bowl shaft with taper collets of Grade 416 stainless steel. The bowls shall have bronze wear rings.

2. The pump shaft shall be of stainless steel A276, Grade 416 turned, ground and polished. It shall be supported by bronze bearings of ASTM B505 alloy C89835 above and below each impeller. The motor adapter and discharge case bearing shall be grease lubricated and protected from abrasives by bronze sand collars of ASTM B584. The size of the shaft shall be no less than that determined by ANSI/AWWA Specifications E103, Section 4.4, paragraph 4.4.2.2. The motor coupling shall be constructed of A276 type 416 stainless steel either keyed or splined as required to fit the motor shaft.
- E. Suction Pipe: Five to ten feet of steel suction pipe, same size as pump suction fitting.
- F. Oil Lubricator: Three gallon capacity aluminum reservoir with immersion heater and thermostat, filled as recommended by pump manufacturer; solenoid valve for automatic stop/start control of oil flow; flow regulating valve with sight glass; piping bypass around solenoid control valve with needle valve. Provide and install low level oil switch "Milltronics Pointek" with one form "c" contact rated 5A @ 30 Vdc and one solid state switch rated 2 VA, Fail Safe (Low Alarm). Oil piping to be type K copper. Mount the oil reservoir securely on the pump discharge head with an oil reservoir stand as shown in the Drawings.
- G. Motor: The Sims Bayou pump shall be driven by a premium efficiency, 2,300-volt, 3 phase, 60 hertz, nominal 1,800 rpm, direct-connected vertical hollow shaft squirrel cage induction motor with 1.15 service factor, shielded, drip-proof, NEMA W.P.II. enclosure for outdoor operation with non-reverse ratchet. The motor, wiring, and insulation shall be copper with non-hydroscopic Class G, Class B temperature rise not to exceed insulation temperature rating when operating at service factor rating and 40°C ambient according to NEMA M.G. 1-1978-12.4.2. Wiring insulation to include extra dips and bakes for Gulf Coast high humidity. Conduit box shall be cast iron, water-tight and weatherproof. Provide a minimum of six, three wire, 100 Ohm, Platinum RTDs, two per Phase spaced equally around the circumference of the stator for future connection. The motor is to be equipped with 120-volt space heaters and guard screens.

The bearings in the motor shall be ball or spherical roller oil-lubricated. Provide a 100 Ohm, Platinum RTD, at each bearing for future connection. The thrust bearing in the vertical hollow shaft motor shall have an external thrust capacity capable of carrying 1.5 times the weight of all rotating parts of the pump plus the hydraulic load imposed by the impellers when the pump is operating at the capacity and total field head given for the future conditions. Radial and thrust bearings are to have a B-10 life of 75,000 hours and to have a bearing housing

LINESHAFT DEEP WELL PUMPS

WBS No. S-000100-0024-4

large enough to hold sufficient lubricant to minimize the need for frequent lubrication. Facilities are to be provided for adding new oil or grease and draining old oil without major motor disassembly.

Minimum motor efficiency to be 95.0 percent at full load and the motor is to have a maximum locked rotor indicating code letter of F. The minimum power at rating is to be 0.85.

The motor is to be equipped with a stainless steel name plate securely attached to the motor with stainless steel screws. All data is to be permanently stamped into the name plate including the motor horsepower, rpm, NEMA design, phase, hertz, service factor, ambient temperature, frame size, duty, class of insulation, locked KVA code, full load amps, locked rotor amps, model and catalog number, bearing identification by AFBMA number and NEMA nominal efficiency.

The motors shall be manufactured by U.S. Motors, General Electric, Reliance, Toshiba, or Siemens-Electric Machinery. No substitutions accepted.

2.05 PUMP FOUNDATION

- A. The pump foundation shall be of reinforced cast-in-place concrete.
- B. Concrete and reinforcing steel shall conform to Section 03315 – Concrete for Utility Construction.
- C. If it is necessary to make any changes to the pump foundation to install a pump, the Contractor shall obtain prior approval of the City and shall make the change at his own expense.

2.06 AIR-LINE TUBING

- A. The air-line tubing shall be type 1005-44204 Dekoron, 1/4-inch O.D., single line, stainless steel tubing with 0.032-inch wall thickness, PVC coating, as manufactured by Eaton Control Systems, or approved equal. The run of air-line tubing shall be one continuous length from end to end without any splice or joint.

2.07 SOLUTION TUBING

- A. Solution tubing, installed on the column pipe for insertion of chemical solution shall be Schedule 80, NSF-PW, 1120, PVC (polyvinyl chloride) plastic pipe in accordance with ASTM Standard D1785, color – gray, 1-1/4-inch I.D., as manufactured by Jet Stream Plastics, Inc., or approved equal, in 20-foot joints with bell-and-spigot ends for PVC cement-solvent welding.

- B. The solution tubing strings shall be two continuous lengths of tubing on opposite sides of the column pipe that extend from the bowl assembly discharge case through the discharge head base to the access plugs. The solution tubing strings shall be secured to each column pipe joint, a minimum of two separate locations, utilizing vinyl filament tape or approved equal. The solution tubing strings shall be secured to the top side of the discharge head utilizing a CGB connector, straight male thread, steel finish, 2-inch I.P. thread size, complete with gland nut and neoprene bushing (Catalog No. CGB 5913) as manufactured by Crouse-Hinds, or approved equal. The solution tubing strings shall be provided with sufficient stick-up above the discharge head base for ready access and a PVC screwed joint plug. The bottom of each solution tubing string shall be open.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Pump shall be installed in accordance with manufacturer's written instructions by a water well contractor with specific experience installing lineshaft deep well pumps.
- B. Equipment will be installed in accordance with manufacturer's instructions, if included, using lifting lugs, as provided, or by slings attached to the equipment. No temporary lifting lugs shall be utilized. Equipment shall be handled with sufficient care to prevent damage. Slings shall have adequate protection to prevent marring the surfaces of the equipment.
- C. Air-Line Tubing: The air-line tubing shall be one unbroken continuous length from the bowl assembly discharge case through the discharge head base to the air-line gauge assembly. The tubing shall be secured to each column pipe joint, a minimum of one location, utilizing vinyl filament tape, or approved equal. The tubing shall be secured to the top side of the discharge head base utilizing a CGB connector, straight male thread, steel finish, 1-inch I.P. thread size, complete with gland nut and neoprene bushing (Catalog No. CGB 293) as manufactured by Crouse-Hinds, or approved equal.
- D. Air-Line Gauge: Marshalltown, 4-1/2-inch, dual scale, calibrated in feet of water and pounds per square inch.
- E. Air Pump: Provide hand air pump and Schraeder or Deming snifter valve.

3.02 EFFICIENCY AND TESTING

- A. The overall wire-to-water efficiency of the installed pump and motor shall be determined by measurement of capacity, field head, and kilowatt input to the

LINESHAFT DEEP WELL PUMPS

WBS No. S-000100-0024-4

motor. An overall wire-to-water efficiency test shall be conducted by the Contractor on the pump after installation and before final acceptance.

- B. The Contractor shall supply all equipment, instruments, and labor necessary for such test and the City's representative shall be present during the test.
- C. Readings shall be taken at a number of points from about 70 percent of design capacity to maximum capacity. A watt-meter shall be used to determine kilowatt input to the motor. Electric current shall be measured on the incoming power side.
- D. Contractor shall prepare a field head-capacity curve from test data and submit four copies of it to the City. Any deficiencies in the head-capacity or efficiency or operation of a pump and motor shall be corrected by the Contractor at its expense prior to acceptance.

3.03 WARRANTY

- A. The pump manufacturer shall warrant the units being supplied to the City against defects in workmanship and material for a period of one year after substantial completion, operation and service. The warranty shall be in printed form and apply to all units.

3.04 PUMP FOUNDATION

- A. The pump foundation shall be of reinforced cast-in-place concrete in conformity with Section 03315-Concrete for Utility Construction, and with dimensions and details as shown on the Drawings.
- B. All cement grout shall be removed from the surface casing inside the foundation, leaving the exposed surface of the casing clean before concrete for the foundation is placed.
- C. The surface casing vent pipe shall be cut into the surface casing and welded to it prior to placing the forms for the concrete pump foundation. The angle formed between the axis of the surface casing and the axis of the vent pipe shall not be greater than 45 degrees, and the threaded upper end of the vent pipe shall extend outside the final face of the foundation as shown by the Drawings.

3.05 STERILIZATION

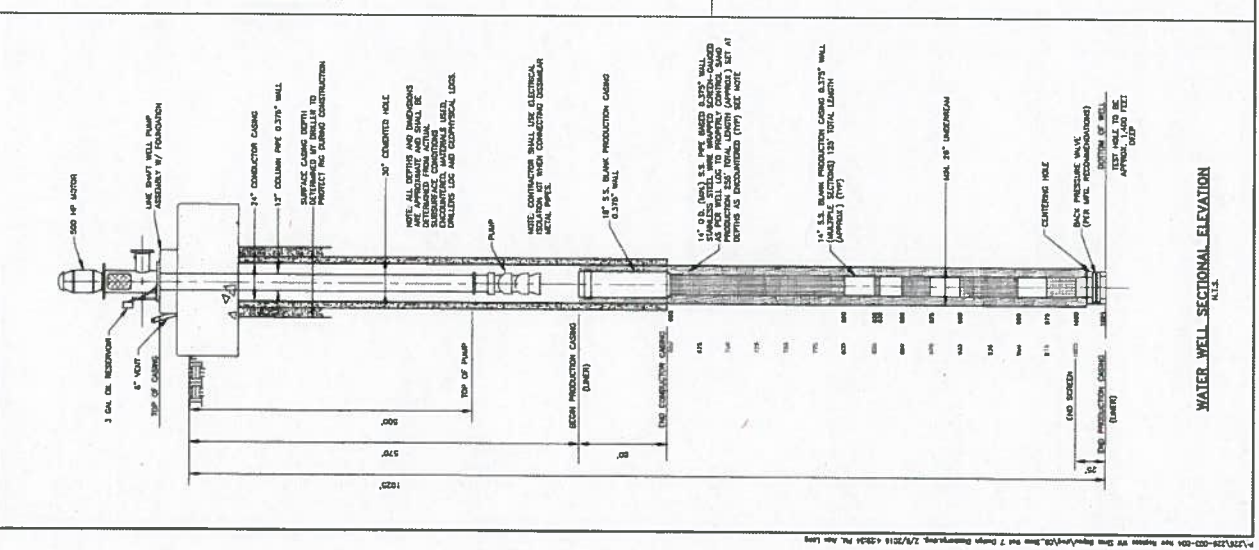
- A. Disinfection procedures shall be in accordance with AWWA Standards for Disinfection of Wells—ANSI/AWWA C654.

- B. Samples for bacteriological analysis shall be collected in a sterile container at the pump discharge, and a test made for coliform organisms. After sterilization, the well shall be pumped at open discharge until at least 500,000 gallons of water have been pumped before the first sample is collected. The samples shall be collected on three consecutive days and shall be tested for coliform organisms at the City of Houston East Water Treatment Plant on Federal Road. Samples shall be collected and analyzed on three successive days without chlorination between sampling. If any coliform organisms are found in any of the samples, the Contractor shall re-sterilize the pump and well and have the water resampled as stated above until such time as no coliform organisms are found in the water samples collected after at least 500,000 gallons have been pumped from the well after the last well chlorination prior to collecting the first sample and two additional samples are collected on three successive days following sterilization. All expenses of sterilization of the pump and analyses for coliform organisms shall be borne by the Contractor.
- C. The water discharged by the pump following disinfection shall be dechlorinated to a level of 2.0 or less mg/l chlorine before it is allowed to leave the site.

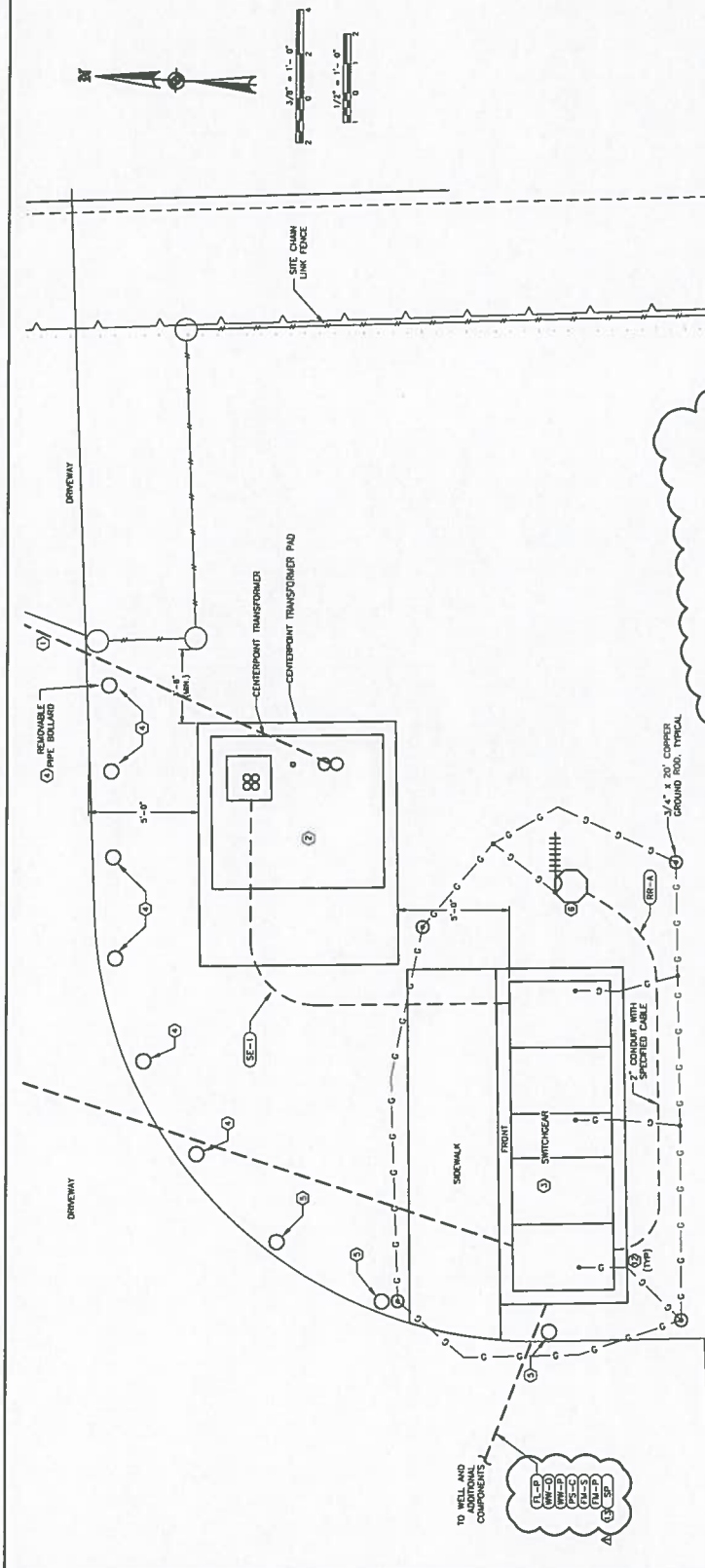
PUMP DIMENSIONS SCHEDULE
(Anticipated initial conditions)

	Sims Bayou Well No. 7
Pumping Rate, gpm	2,800 gpm
Static Water Level, feet	240
Pumping Water Level, feet	360
Column Pipe Diameter, inch	12
Column Pipe Setting, feet	500
Solution Tubing, feet	500
Air-Line Tubing, feet	500
Lineshaft Motor, hp	500
Motor Voltage, volts	2,300
Maximum RPM	1,800
Minimum Bowl Efficiency, percent	82
Maximum Pump Bowl Outside Diameter, in.	14

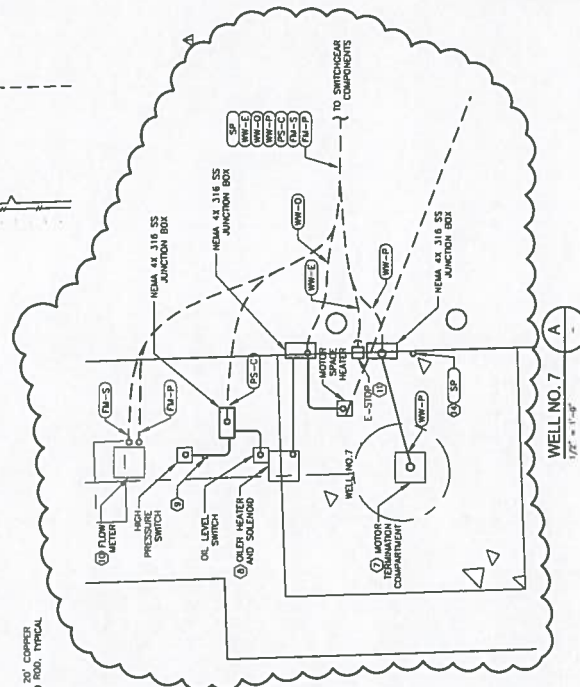
END OF SECTION



REV	DATE	BY	APP
1	05/11/16	MM	
2	05/11/16	MM	



SWITCHGEAR
1/2" = 1'-0"



- NOTES:
1. TRANSFORMER PRIMARY DUCT BANK SHALL BE INSTALLED PER CIP TERMS AND CONDITIONS PACKAGE WITH TWO SIX INCH PAC CONCRETE ENCASED DUCTS.
 2. CENTERPOINT TRANSFORMER CONCRETE PAD SHALL BE LOCATED AND INSTALLED IN STRICT COMPLIANCE WITH CIP TERMS AND CONDITIONS. SEE SPECIFICATION 16950 FOR TYPICAL CIP TRANSFORMER DETAIL.
 3. NEW 1/2 IN METAL GLASS SWITCHGEAR SHALL BE INSTALLED ON A CONCRETE PAD. SEE DRAWING E-6 FOR METAL EQUIPMENT ELEVATION.
 4. PROVIDE REMOVABLE PIPE BOLLARDS ALONG DRIVE ACCORDING TO CIP TERMS AND CONDITIONS.
 5. PROVIDE PRECAST CONCRETE POLE FOR RADIO ANTENNA ACCORDING TO DETAILS ON DRAWINGS E-5.
 6. PROVIDE MEDIUM VOLTAGE "MOTOR TERMINATION KIT".
 7. COORDINATE PRIOR TO BID WITH PROVIDER FOR OLDER ANTENNA ACCORDING TO DETAILS ON DRAWINGS E-5.
 8. COORDINATE PRIOR TO BID WITH PROVIDER FOR OLDER SYSTEM SPECIFIC REQUIREMENTS TO INCLUDE ALL CONNECTIONS FOR A COMPLETE WORKING SYSTEM.
 9. PROVIDE 3/4 IN S.S. SPARE CONDUIT FOR WELL-BORED CONDUIT.
 10. COORDINATE PRIOR TO BID WITH VENDOR TO PROVIDE ALL CONNECTIONS REQUIRED FOR A WORKING FLOW METER. SEE DETAIL 4 ON DRAWING E-7 FOR TRANSMITTER INSTALLATION.
 11. PROVIDE EMERGENCY STOP SWITCH INSTALLED WITH 3/4 IN S.S. MOUNTING COMPONENTS.
 12. PROVIDE 4/0 BARE COPPER GROUND CONDUCTORS. SEE ONE LINE DIAGRAM FOR CONNECTION POINTS.
 13. PROVIDE 1" SPARE CONDUIT FROM CONTROL SECTION TO PUMP FOUNDATION.
 14. STUB UP SPARE CONDUIT "3" IN" AT FOUNDATION IN CONCRETE ENCASED PROTECTION AND CAP CONDUIT.

THIS "A" DRAWING SHALL BE PRINTED ON THE LAST SIZE OF BLUE PRINT. THIS "A" DRAWING SHALL BE PRINTED ON THE LAST SIZE OF BLUE PRINT. THIS "A" DRAWING SHALL BE PRINTED ON THE LAST SIZE OF BLUE PRINT.

AEI
ENGINEERING
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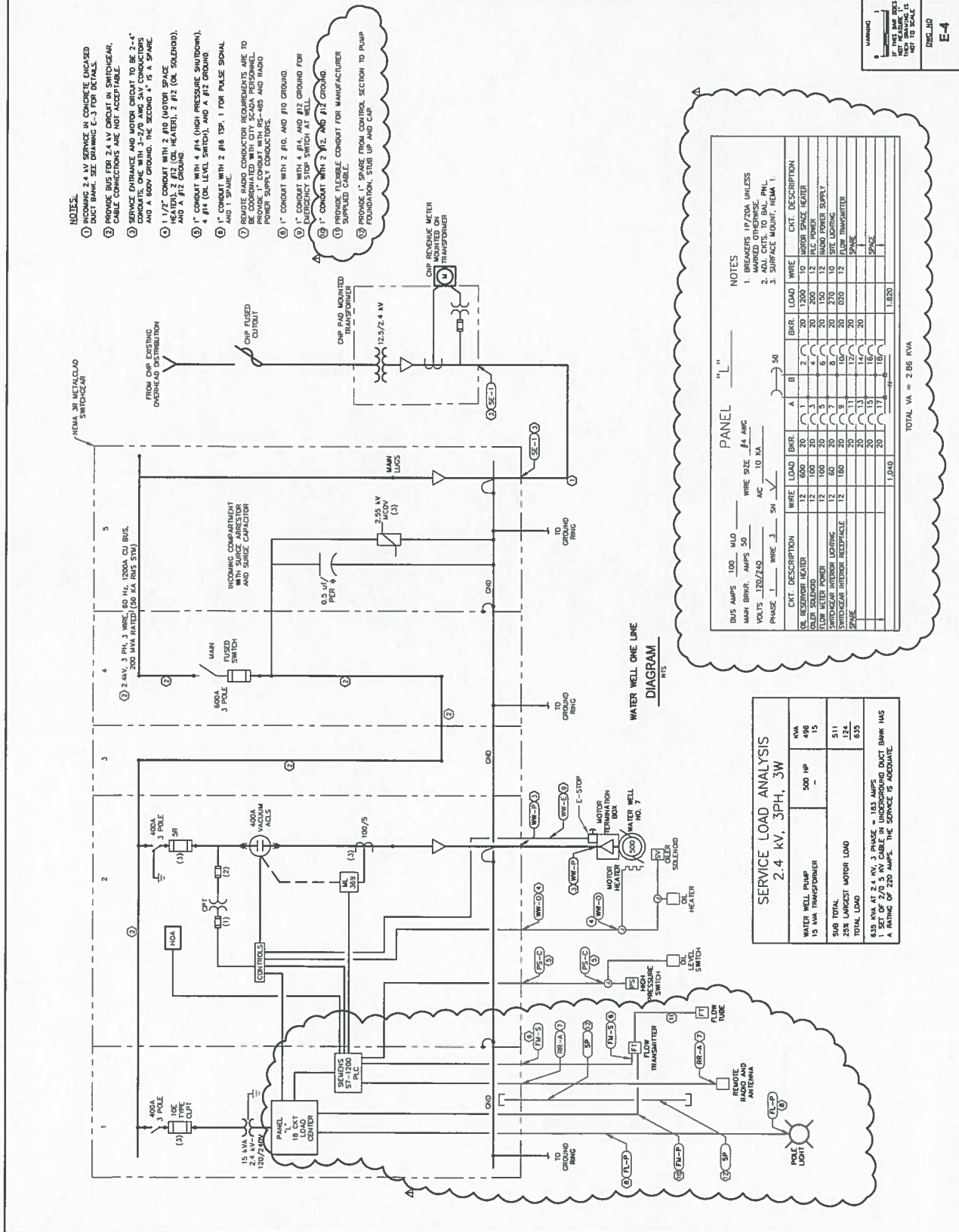
APPROVED: MMH DATE: JANUARY 2016
DESIGNED BY: RWH DRAWN BY: CM



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
NEW/REPLACEMENT OF WATER WELL
AND WELL COLLECTION LINE
SIMS BAYOU
ELECTRICAL
ENLARGED SITE PLAN

WBS NUMBER	S-000100-0024-4
DRAWING SCALE	AS SHOWN
CITY OF HOUSTON PM	MMH P.E. - AJ
SHEET NO.	29 OF 36

ADDENDUM NO. 1




TW "A" AIRROAD SPUR IN POWER POLE ON THE EAST SIDE OF BLUE
RIDGE ROAD, AS SHOWN HEREIN. STA. 1+04.85, OFFSET 23.167'. ELEV.
61.18'

SIDECOURT.

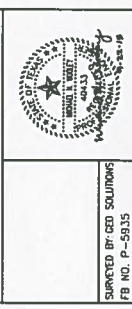
CITY OF HOUSTON MAPPER No. 3193-7211 LOCATED IN CONCRETE ON THE
EAST SIDE OF BLUE RIDGE ROAD, AS SHOWN HEREIN. ELEV. 39.51' (NAD)
LOCATED IN CONCRETE ON THE WEST SIDE OF BLUE RIDGE ROAD, AS
SHOWN HEREIN. TO CONVERT TO NAD 1983 (2001 AD) ADD
0.12 METERS

AEI
ENGINEERING

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KGI  **Kalluri Group, Inc.**
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 10497 Town & Country Way, Suite 220
 Houston, Texas 77024
 Phone: (713)-385-0286

APPROVED:	WHW	DATE:	JANUARY 2016
DESIGNED BY:	PHW	DRAWN BY:	CM



CITY OF HOUSTON
DEPARTMENT OF PUBLIC WORKS AND ENGINEERING
NEW/REPLACEMENT OF WATER WELL
AND WELL COLLECTION LINE
SIMS BAYOU
ELECTRICAL

**ONE LINE DIAGRAM
AND LOAD ANALYSIS**

	THE CITY OF HOUSTON USE ONLY
WEBB NUMBER S-000100-0024-A	
DRAWING SCALE AS SHOWN	
CITY OF HOUSTON PD	
NA WD, P.E. M	
SHEET NO. 30 OF 36	

ADDENDUM NO. 1

[illegible]

SERVICE LOAD ANALYSIS		
2.4 KV, 3PH, 3W		
WATER WELL PUMP 15 KVA TRANSFORMER	500 HP —	KVA 496 15
SUB TOTAL		511
25% LARGEST MOTOR LOAD		125
		635
635 KVA AT 2.4 KV, 3 PHASE = 10.3 AMPS 10.3 AMPS X 2.4 KV = 24.72 KW A RATING OF 250 AMP. THE SERVICE IS ADEQUATE.		

